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IN THE UNITED STATES

PATENT AND TRADEMARK OFFICE

APPLICANTS: Ted E. Dunning and Bradley D. Kindig

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TITLE: Relationship Discovery Engine

EXAMINER: Not yet known

GROUP ART UNIT: 2165

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COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

PETITION TO MAKE SPECIAL

SIR:

Applicants hereby petition to make the above-referenced application special as described in MPEP §708.02 VIII. No examination has yet be en taken by an Examiner in this case. The claims are directed to a single invention. If the Office determines that all the claims presented are not obviously directed to a single invention, Applicants will make an election without traverse as a prerequisite to the grant of special status.

A pre-examination search has been made with respect to the present invention by the professional searching company MetroPatent. The following classes and subclasses were

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searched: Class 709, subclass 231. Additional search of EAST was conducted by Applicants' representatives.

Pursuant to the provisions of 37 CFR 1.56 and 1.97-98, enclosed herewith is a modified form PTO-1449 listing references for consideration by the Examiner. A copy is enclosed of each of those references not already of record and deemed most closely related to the subject matter encompassed by the claims. The inclusion of these references shall not be construed as a representation regarding the completeness of the list of references, or that inclusion of a reference in this list is an admission that it is prior art or is pertinent to this application, or as an admission that the information listed is, or may be considered to be, material to patentability, or that no other material information exists, and shall not be construed as an admission against interest in any manner.

Detailed Discussion of the References

Pursuant to the provisions of MPEP §708.02 VIII, the following is a detailed discussion of the references listed in the accompanied modified form PTO-1449, which discussion points out, with the particularity required by 37 CFR 1.111(b) and (c), how the claimed subject matter is patentable over the references.

Independent claim 1 recites:

1. A computer-implemented method of discovering relationships between items, comprising:

    accepting item selections from a plurality of users;

    generating a log for each user, each log containing identifiers for the user's item selections;

accepting a query including at least one query item identifier;

scoring the user logs, responsive to a degree of occurrence of the at least one query item identifier in the user logs, to generate user log scores; and

determining at least one result item, responsive to a degree of occurrence in at least a subset of the scored user logs.

Independent claim 34 recites:

34. A computer-implemented method of discovering a relationship between a first item and a second item, comprising:

determining a total number of item groups N;

determining a number of item groups N_1 in a subset of item groups, the subset of item groups being defined as including those item groups that contain a second item;

determining a number of item groups N_2 not in the subset of item groups;

determining a number of item groups k_{11} in the subset that contain the first item;

determining a number of item groups k_{12} not in the subset that contain the first item;

determining a number of item groups $k_{21} = N_1 - k_{11}$ in the subset that do not contain the first item;

determining a number of item groups $k_{22} = N_2 - k_{12}$ not in the subset that do not contain the first item;

and determining a log likelihood ratio.

Independent claim 39 recites:

39. A system for discovering relationships among items, comprising:

   a user interface for accepting item selections from a plurality of users;

   at least one log database, coupled to the user interface, for storing a log for each user,

   each log containing identifiers for the user's item selections;

   a query input device for accepting a query including at least one query item identifier;

   and

   a recommendation engine, coupled to the log database and to the query input device,

   for scoring the user logs, responsive to a degree of occurrence, to generate

   user log scores, and for determining at least one result item, responsive to a

   degree of occurrence in at least a subset of the scored user logs.

Independent claim 59 recites:

59. A computer-readable medium comprising computer-readable code for discovering

relationships between items, comprising:

   computer-readable code adapted to accept item selections from a plurality of users;

   computer-readable code adapted to generate a log for each user, each log containing

   identifiers for the user's item selections;

   computer-readable code adapted to accept a query including at least one query item

   identifier;

computer-readable code adapted to score the user logs, responsive to a degree of occurrence of the at least one query item identifier in the user logs, to generate user log scores; and

computer-readable code adapted to determine at least one result item, responsive to a degree of occurrence in at least a subset of the scored user logs.

Independent claim 93 recites:

93. A computer-readable medium comprising computer-readable code for discovering a relationship between a first item and a second item, comprising:

computer-readable code adapted to determine a total number of item groups N;

computer-readable code adapted to determine a number of item groups N_1 in a subset of item groups, the subset of item groups being defined as including those item groups that contain a second item;

computer-readable code adapted to determine a number of item groups N_2 not in the subset of item groups;

computer-readable code adapted to determine a number of item groups k_{11} in the subset that contain the first item;

computer-readable code adapted to determine a number of item groups k_{12} not in the subset that contain the first item;

computer-readable code adapted to determine a number of item groups $k_{21} = N_1 - k_{11}$ in the subset that do not contain the first item;

computer-readable code adapted to determine a number of item groups $k_{22} = N_2 - k_{12}$

not in the subset that do not contain the first item; and

computer-readable code adapted to determine a log likelihood ratio.

The present invention provides a recommendation engine and application capable of discovering relationships among items and recommending items without requiring undue effort on the part of the user. The recommendations provided by the present invention are based on user profiles that take into account actual preferences of users, without requiring users to complete questionnaires. The present invention provides improved data analysis by avoiding inaccurate assumptions regarding distribution of user preferences. In particular, the present invention employs a binomial log likelihood ratio to provide improved analysis of data points describing user preferences. The invention thus provides improved recommendation generation, while avoiding the problems of overstatement of coincidences and dominance of bestsellers.

The claims are directed toward several different variations of these recommendation engine techniques. Claim 1 recites a method for discovering relationships by accepting item selections from a plurality of users, generating a log for each user, accepting a query including at least one query item identifier, scoring the user logs responsive to a degree of occurrence of the at least one query identifier in the user logs, to generate user scores. Claim 34 recites a method claim for discovering a relationship between a first and second item by determining a total number of item groups N, determining a number of item groups N_1 in a subset of item groups, determining a number of item groups N_2 not in the subset of item groups, determining a number of item groups k_{11} in the subset that contain the first item, determining a number of item groups k_{12} not in the subset that contain the first item, determining a number of item

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groups $k_{21} = N_1$-k_{11}, determining a number of item groups $k_{22} = N_2$-k_{12}, and determining a log

likelihood ratio. Claim 39 recites a system for discovering relationships using a user interface

for accepting item selections from a plurality of users, at least one log database, a query input

device for accepting a query including at least one query item identifier, and a

recommendation engine for scoring the user logs. Claim 59 recites a computer program

product corresponding to the method of claim 1. Claim 93 recites a computer program

product corresponding to the method of claim 34.

U.S. Patent No. 6,065,058 to Hailpern et al., "Dynamic Push Filtering Based on Information
Exchanged Among Nodes in A Proxy Heirarchy"

Hailpern et al. is understood to disclose a method and system for filtering push

information in a client-server hierarchy based on actual usage information. A pushed object is

communicated down the hierarchy by communicating usage information up the hierarchy and

filtering the pushed object based on the communicated usage information. Usage information

can include actual object reference/access patterns.

However, Hailpern et al. does not teach the invention of claims 1, 34, 39, 59, or 93

and in particular does not teach any technique for accepting a query. Rather, Hailpern et al.

uses filtering to push an object to a user, and in fact solves a completely different problem

than that addressed by the present invention. Hailpern et al. seeks to reduce network traffic

caused by increased popularity of the world wide web. Specifically, Hailpern et al. teaches a

push based filtering approach intended to avoid delays caused by increased traffic when a user

requests a document. Hailpern et al. pushes objects through a client-server hierarchy without

a request by the user. Thus, Hailpern et al. fails to disclose any technique for accepting a

query as claimed herein, and in fact teaches away from accepting a query since push

technology generally involve

Furthermore, with respect to claims 34 and 93, Hailpern et al. does not teach any

technique for using a log likelihood ratio. Rather, Hailpern et al. merely discloses the use of a

usage label to convey preference information. The preference information in the usage label

consists of a usage category and a preference category. The usage category is a simple count

of the number of times an object is referenced by a user. The preference category conveys

user-identified preferences. In neither case does Hailpern et al. use a log likelihood ratio as

recited in claims 34 and 93.

U.S. Patent Application Publication No. US 2002/0013852 A1 to Janik, "System for providing Content Management, and Interactivity For Thin Client Devices"

Janik is understood to disclose a system for delivering content, data, and application

services to a variety of thin client devices. The system is used to provide a means for end

users to program preference-based content for delivery at various client services, and then to

automatically or under the control of the user, send the content to client devices for

presentation to the end user.

However, Janik does not teach the invention of claims 1, 34, 39, 59, or 93 and in

particular does not teach any technique for scoring user logs, responsive to a degree of

occurrence of at least one query item identifier in user logs. Rather, Janik provides the user

with the ability to group audio files into user defined playlists. Since the playlist is user

defined, it teaches away from a relationship discovery engine claimed in the present invention.

In particular, in the system disclosed in Janik, the user identifies content to be delivered. Janik does not disclose scoring user logs, responsive to a degree of occurrence of at least one query item identifier in user logs as claimed herein. Furthermore, Janik fails to disclose a technique for determining at least one result item as claimed herein. Janik merely permits the user to group audio files and consequently has no need to score user logs to discover relationships or to determine a result item. In contrast, the present invention recommendation engine makes a recommendation by determining at least one result item responsive to a degree of occurrence in at least a subset of the scored user logs.

Furthermore, with respect to claims 34 and 93, Janik does not teach any technique for using a log likelihood ratio. Janik does not teach any sort of scoring or use of a log likelihood ratio since the playlists in Janik are user defined.

U.S. Patent Application Publication No. US 2001/0044855 A1 to Vermeire et al., "System for Accessing Content"

Vermeire et al. is understood to disclose a system for accessing content from the Internet and other computer networks using a database, a content provider interface, and a viewer interface. The database maps channel codes to network addresses as well as to content descriptions. The content provider assists content providers in entering network addresses and content descriptions for their information and entertainment content into the database. The viewer guide displays the content descriptions and a network browser allows a user to view the content of a channel. Additionally, the network browser creates a Favorite Channel system

including a submenu for each genre and assigns each channel the user designates as a favorite to that genre submenu.

However, Vermeire et al. does not teach the invention of claims 1, 34, 39, 59, or 93 and in particular does not teach any technique for scoring user logs, responsive to a degree of occurrence of at least one item identifier in the user logs. Even though Vermeire et al. teaches the use of a Favorite Channel system, the channels in the Favorite Channel system are assigned by the user. The user must identify a favorite channel for the browser to include in the Favorite Channel system. Since such channels are user identified, Vermeire system teaches away from a relationship discovery engine as claimed herein. The present invention recommendation engine scores user logs, responsive to a degree of occurrence of at least one item identifier in the user logs. Thus, the present invention implements a scoring process without requiring the user to assign a score or a favorite.

Furthermore, Vermeire et al. fails to disclose any technique for determining at least one result item. Vermeire et al. discloses merely having a user identify a favorite. In contrast, the present invention recommendation engine determines at least one result item and is therefore not reliant on a user identifying favorites.

Furthermore, with respect to claims 34 and 93, Vermeire et al. does not teach any technique for using a log likelihood ratio. Vermeire et al. does not teach any sort of scoring or use of a log likelihood ratio since the system in Vermeire et al. is user defined.

U.S. Patent Application Publication No. US 2001/0042107 A1 to Palm, "Networked Audio Player Transport Protocol and Architecture"

Palm is understood to disclose a system for communications using a networked multimedia device and a media server. A user may navigate and select a particular media item to be played. The user, also, can indicate user preferences such as a hierarchical list, searches and content provider suggestions.

However, Palm does not teach the invention of claims 1, 34, 39, 59, or 93 and in particular does not disclose any technique for scoring user logs. In Palm's system a user may indicate preferences, but there is no scoring user logs. Palm merely permits a user to identify and select a playlist. Palm does not disclose any technique for scoring user logs because the system in Palm is user defined.

Furthermore, Palm fails to disclose a technique for determining at least one result item, responsive to a degree of occurrence in at least one subset of the scored user logs. The system disclosed in Palm permits an interactive search for specific titles using key words. It will be appreciated that an interactive search is not determining a result item responsive to a degree of occurrence in at least a subset of user logs. Additionally, Palm discloses permitting a user to select and identify a song or playlist. Each selection in the Palm system is a selection made by the user. Thus, the system disclosed in Palm teaches away from the present invention because in the Palm system selections are user defined. In particular, there is no teaching in Palm of scoring user logs or determining result items based on the scored logs as claimed herein.

Furthermore, with respect to claims 34 and 93, Palm does not teach any technique for using a log likelihood ratio. Palm does not teach any sort of scoring or use of a log likelihood ratio since the system in Palm is user defined.

Other Claims

Since the cited references do not disclose the claimed features discussed above, claims 1, 34, 39, 59, and 93 are patentably distinguishable over the references. The remaining claims in the present application each incorporate the limitations of claims 1, 34, 39, 59, or 93, and include additional features and limitations. Therefore, all claims herein are patentably distinguishable over the cited references for at least the reasons discussed above.

Consideration of the cited references and other information and grant of special status by this petition is solicited.

Respectfully submitted,

Dated: _May 4, 2002_

By: _____

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